

SECRET

MONTHLY REPORT

CONTRACT

25X1

PAR 217

2 Oct 64

SUBJECT: Optimization of Lasers

TASK/PROBLEM

1. Explore the production of 0.53-micron (blue-green) laser radiation by harmonic doubling in KDP and ADP crystals.

DISCUSSION

2. During this period quantitative measurements were made of the second harmonic conversion efficiencies from our one inch long KDP crystal. These measurements were made using a two meter long laser cavity, and a 10^4 attenuator ahead of the harmonic detecting phototube to prevent saturation.

3. The results of these measurements indicated that with 156 joules of 1.06 energy incident on the KDP crystal, over 4×10^{-3} joules of 0.53 radiation were generated. This represents a conversion efficiency of almost 3×10^{-3} percent, or in terms of second harmonic power, about 4 watts. To further increase this output, either a larger laser rod must be used to afford an increase in energy or a Q-Switching mechanism incorporated into the setup to decrease the pulse duration.

4. Current effort is being directed toward a photographic study of the second harmonic beam structure. The initial exposures on this study were made of the harmonic beam, unmodified and diverged, incident on a non specular reflecting surface. The results indicate that the beam is not homogeneous. Areas within the beam pattern appear to vary in density as much as two orders of magnitude.

PLANNED ACTIVITY

5. This photographic study will continue with emphasis on photographing the direct harmonic beam and finding possible means to increase its uniformity.

Declass Review by NIMA/DOD

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